



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

APR 16 2003

FROM: HQ AFCESA/CES
139 Barnes Drive
Tyndall AFB, FL 32403-5319

SUBJECT: **Engineering Technical Letter (ETL) 03-3: Air Force Carpet Standard**

1. Purpose. This ETL provides technical and aesthetic selection criteria for acquisition, installation, maintenance, and eventual disposal of broadloom carpet, carpet tiles, and carpet pad. It supersedes ETL 00-6, 11 May 2000.

Note: This ETL is substantially revised and should be completely reviewed.

2. Application: Approved areas of all Air Force facilities, regardless of fund source.

2.1. Authority:

- Air Force Policy Directive (AFPD) 32-10, *Installations and Facilities*.
- Air Force Instruction (AFI) 32-1023, *Design and Construction Standards and Execution of Facility Construction Projects*.
- AFI 32-7080, *Pollution Prevention Program*.
- Military Handbook (MIL-HDBK) 1191, *Medical Military Construction Program Facilities Design and Construction Criteria*.

2.2. Effective Date: Immediately.

2.3. Ultimate Recipients:

- Installation civil engineer (CE) personnel
- Project managers (PM)
- Interior designers
- Facility managers
- Design consultants
- Design agents

2.4. Coordination: Air Force major command (MAJCOM)/installation interior designers and the Air Force Center for Environmental Excellence, Environmental Quality Directorate (HQ AFCEE/EQT).

3. References.

3.1. Public Law:

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

- Code of Federal Regulations (CFR) Part 1630, *Standard for the Surface Flammability of Carpets and Rugs (FF 1-70)*, http://www.access.gpo.gov/nara/cfr/waisidx_99/16cfr1630_99.html.
- Public Law 101-336, Americans with Disabilities Act, <http://www.usdoj.gov/crt/ada/pubs/ada.txt>.

3.2. Federal Government:

- Americans with Disabilities Act Accessibility Guidelines (ADAAG), <http://www.usdoj.gov/crt/ada/adahom1.htm>
- Uniform Federal Accessibility Standards (UFAS), <http://www.access-board.gov/ufas/ufas-html/ufas.htm>
- Environmental Protection Agency (EPA) Comprehensive Procurement Guidelines (CPG), <http://www.epa.gov/cpg>
- Federal Acquisition Regulation, <http://www.arnet.gov/far/>

3.3. Department of Defense (DOD):

- MIL-HDBK-1191, *Medical Military Facilities, Design and Construction Criteria*, http://www.efdlant.navfac.navy.mil/lantops_15/documents/MH/1191_2002.pdf

3.4. Air Force:

- AFD 32-10, *Installations and Facilities*, <http://www.e-publishing.af.mil/pubfiles/af/32/afpd32-10/afpd32-10.pdf>
- AFI 32-1023, *Design and Construction Standards and Execution of Facility Construction Projects*, <http://www.e-publishing.af.mil/pubfiles/af/32/afi32-1023/afi32-1023.pdf>
- AFI 32-7080, *Pollution Prevention Program*, <http://www.e-publishing.af.mil/pubfiles/af/32/afi32-7080/afi32-7080.pdf>
- *Carpet Selection Handbook*, <http://www.afcee.brooks.af.mil/dc/dcd/interior/intdespu.asp>
- *Military Family Housing Guide*, <http://www.afcee.brooks.af.mil/dc/dch/mfhguide/guide.asp>

3.5. Private Industry.

3.5.1. American Society for Testing and Materials (ASTM):

- ASTM D1335-98, *Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings*
- ASTM E648-00, *Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source*

Order from: <http://www.document-center.com/home.cfm/sid=20478080/>

3.5.2. American Association of Textile Chemists and Colorists (AATCC):

- AATCC Test Method (TM) 16E, *Colorfastness to Light*, http://www.aatcc.org/Technical/Test_Methods/scopes/tm16.cfm

- AATCC TM 134-1996, *Electrostatic Propensity of Carpets*,
http://www.aatcc.org/Technical/Test_Methods/scopes/tm134.cfm

3.5.3. Carpet and Rug Institute (CRI):

- CRI TM-101, *Assessment of Carpet Surface Appearance Change Using the CRI Reference Scales*,
http://www.carpet-rug.com/technical_bulletins/9907_CRI_TM_101.pdf
- CRI 104-1996, *Standard for Installation of Commercial Carpet*,
http://www.carpet-rug.com/pdf_word_docs/104.pdf
- CRI 105-2002, *Standard for Installation of Residential Carpet*,
http://www.carpet-rug.com/pdf_word_docs/105.pdf

4. Acronyms and Terms:

| | |
|------------------|--|
| AATCC | - American Association of Textile Chemists and Colorists |
| ADA | - Americans with Disabilities Act |
| ADAAG | - Americans with Disabilities Act Accessibility Guidelines |
| AFI | - Air Force Instruction |
| AFNAF | - Air Force non-appropriated funds |
| AFPD | - Air Force Policy Directive |
| ARR | - Appearance Retention Rating |
| ASTM | - American Society for Testing and Materials |
| CE | - civil engineer |
| CFM | - contractor-furnished material |
| CFR | - Code of Federal Regulations |
| CPG | - Comprehensive Procurement Guidelines |
| CRI | - Carpet and Rug Institute |
| DFAR | - Defense Federal Acquisition Regulation |
| DOD | - Department of Defense |
| EO | - Executive Order |
| EPA | - Environmental Protection Agency |
| ETL | - Engineering Technical Letter |
| FAR | - Federal Acquisition Regulation |
| g/m ² | - gram per square meter |
| GFM | - government-furnished material |
| GOQ | - general officer quarters |
| GSA | - General Services Administration |
| HQ AFCEE/DCD | - Air Force Center for Environmental Excellence, Design and Construction Directorate |
| HQ AFCEE/EQT | - Air Force Center for Environmental Excellence, Environmental Quality Directorate |
| HQ AFMSA/SGSF | - Air Force Medical Support Agency, Health Facilities Division |
| IAQ | - Indoor Air Quality |
| kV | - kilovolt |
| MAJCOM | - major command |
| MFH | - military family housing |

| | |
|--------------------|---|
| mm | - millimeter |
| NAF | - non-appropriated funds |
| O&M | - operation and management |
| oz/yd ² | - ounce per square yard |
| PET | - polyethylene terephthalate |
| PM | - project manager |
| PVC | - polyvinyl chloride |
| RFHO | - Regional Health Facilities Office |
| TM | - Test Method |
| UFAS | - Uniform Federal Accessibility Standards |
| VOC | - volatile organic compounds |

5. Technical Assistance. Reference the Air Force *Carpet Selection Handbook* at: <http://www.afcee.brooks.af.mil/dc/dcd/interior/intdespu.asp>.

6. Waivers.

6.1. Medical Facilities. Request waivers through the Regional Health Facilities Office (RHFO) to the Air Force Medical Support Agency, Health Facilities Division (HQ AFMSA/SGSF).

6.2. Family Housing. Unless unusual circumstances apply, carpeting should provide at least seven years of use in family housing. Replacing carpet in general officer quarters (GOQ) more often than every seven years requires approval in advance from the MAJCOM commander in accordance with established policy. In no case will the individuals exercise authority for their own residence.

6.3. Other Facilities. Contact the installation or MAJCOM interior designer (see <http://www.afcee.brooks.af.mil/dc/dcd/interior/intdespu.asp> for points of contact).

7. Authorized Areas.

7.1. Medical Facilities. Reference MIL-HDBK-1191, Appendix A.

7.2. Military Family Housing (MFH). Carpet is authorized for all living areas except kitchens, baths, and patios/porches exposed to weather elements. See paragraph 4.9.1 of the *Military Family Housing Guide*.

7.3. Other Facilities. Carpet is authorized for most areas, with these exceptions: service, maintenance and industrial areas, food preparation areas, toilets and bathrooms, and areas requiring frequent cleaning. Do not use carpet in heavily trafficked areas (such as malls) or areas prone to flooding.

8. Fund Source.

8.1. Appropriated Funds. Carpet purchased with appropriated funds and furnished as government-furnished material (GFM) may be acquired through a General Services Administration (GSA) contract or from open market sources. Open market source acquisition must be in accordance with the Federal Acquisition Regulation (FAR). If the carpet is acquired by a construction contractor and furnished as contractor-furnished material (CFM), it may be purchased from open market sources. Under certain circumstances, construction contractors may be able to access GSA schedules for carpet; however, the contractor should obtain further information from their contracting officer.

8.2. Non-appropriated Funds (NAF). Carpet provided from NAF resources may be purchased from an Air Force non-appropriated funds (AFNAF) contract, GSA contract, or open market sources.

8.3. MFH Funds. Housing funds pay for all new construction carpet purchases. Family housing operations and maintenance (O&M) funds pay for all replacement carpet.

9. Selection Criteria.

9.1. Primary Considerations.

9.1.1. All carpet must comply with applicable health and safety codes, Americans with Disabilities Act Accessibility Guidelines (ADAAG), and Uniform Federal Accessibility Standards (UFAS) (see paragraph 3.2).

9.1.2. Federal agencies are required by law, Executive Orders (EO), FAR, Defense Federal Acquisition Regulation (DFAR), and Air Force policy to consider environmentally preferable products. This includes items that are reused and certain Environmental Protection Agency (EPA) designated carpet products manufactured with recycled or recovered materials. Reference the EPA's Comprehensive Procurement Guidelines (CPG) on recycled carpet products (see paragraph 3.2).

9.1.3. Review and revise carpet specifications to allow the use of recovered materials when the materials meet technical and aesthetic requirements. Compliance with EPA guidelines for recycled product specifications (AFI 32-7080) is mandatory unless the recycled-content product:

- Is unreasonably priced (costs more than comparable non-recycled products).
- Does not meet technical requirements.
- Is not available competitively (from two or more vendors).
- Is not available in a reasonable amount of time.

Consider carpet reuse or regeneration programs that are now being introduced by some manufacturers.

9.2. Recommended Warranty (Minimum):

- Ten-year warranty against 10 percent loss of face fiber.

- Ten-year warranty against edge raveling, snags, picks, runs, and delamination.
- Seven-year warranty against matting and crushing.

9.3. Authorized/Recommended Floor Coverings.

9.3.1. Use carpet tiles in open office areas with furniture systems and areas with raised flooring or flat cable electrical systems. (Equipment is available which allows carpet tile replacement without disassembling system furniture.)

9.3.2. Carpets featuring antimicrobial effectiveness and electrostatic propensity guaranteed for the life of the carpet are required for use in medical facilities and child development centers.

9.3.3. Carpet fibers must be solution-dyed or bleach-resistant for medical facilities and child development centers. Solution-dyed or bleach-resistant carpet is also recommended for lodging facilities and youth centers.

9.3.4. Carpet in child development centers and youth centers must have a soft, non-abrasive surface texture. Cut pile or cut loop type carpet is suggested.

9.3.5. Carpet tile or its associated 1.83-meter (6-foot) wide rolled goods is recommended for installation in corridors.

9.3.6. Use broadloom carpet or carpet tile that contains a pattern or bold, multi-colored tweed, except as noted in paragraph 9.3.6.3. The pattern acts as a camouflage to mask spots and spills until they can be cleaned. A random multi-colored pattern performs better than geometric patterns or tweed. The pattern must cover a majority of the carpet surface. Avoid patterns with definite lines or a design that repeats in a distinctively linear pattern (vertical or horizontal) in corridors, small rooms, or areas with angled walls. These designs are difficult to install parallel to walls. A bold tweed must contain a minimum of three distinctly different colors, e.g., gray, blue, and burgundy.

Note: Order an additional 10 percent of replacement tiles and roll goods to allow for cutting and matching of carpet pattern repeats.

9.3.6.1. Both dark and light colors have potential problems with showing soil stains. An overall medium range with combinations of both light and dark fibers is ideal. Be aware of geographic ground conditions when selecting carpet colors.

9.3.6.2. Solid colors are approved for general officer's or wing/base commander's suites, chapels, and distinguished visitor quarters in lodging. Solid colors may also be used as borders and accents.

9.3.6.3. In residential spaces, carpet must be a neutral color, such as beige or taupe, in a light to medium value. It should provide a flexible background to coordinate with the

décor of successive occupants. White, off-white, or very dark shades are not permitted. Use either solid colors or tone-on-tone tweeds that are muted, i.e., all of the colors in the tweed mix are very close in hue and value.

9.3.7. Heat-setting of yarn helps maintain its twist and minimizes crush and texture loss of cut piles.

9.3.8. Specify durable products that extend the length of replacement cycles to minimize life cycle cost and reduce waste.

9.4. Technical Specifications.

8.4.1. Construction. Broadloom carpet and carpet tile will be tufted, woven, or fusion-bonded.

9.4.2. Fibers:

- Continuous filament nylon 6,6 or nylon 6.
- Wool and wool/nylon blends (except in medical facilities, child development centers, and youth centers).
- Polyethylene terephthalate (PET).
- Other recovered/recycled materials.

9.4.3. Pile Height. Reference ADAAG, Section 4.5.3, *Carpet*, for detailed requirements (no higher than 12.7 millimeters [0.5 inch], measured to the backing, cushion, or pad).

9.4.3.1. Medical Facilities. Pile height minimum is 3.175 millimeters (0.125 inch); maximum is 6.35 millimeters (0.250 inch). Maximum loop height variation within one carpet is 0.762 millimeter (0.030 inch).

9.4.3.2. Family Housing. There is no restriction on pile height in family housing except within units designated as accessible to the disabled in compliance with the Americans with Disabilities Act (ADA).

9.4.4. Pile Weight Density (Minimum). See Attachments 1 and 2 for minimum weight and density by facility type. The method for calculating density is:

$$\frac{36 \times \text{pile weight (oz/yd}^2\text{)}}{\text{pile height (inches)}}$$

or

$$\frac{27 \times \text{pile weight (g/m}^2\text{)}}{\text{pile height (mm)}}$$

9.4.5. Gauge (Minimum). The minimum is 3.175 millimeters (0.125 inch).

9.4.6. Tuft Bind (Minimum):

- 44.5 newtons (10 pounds-force) for broadloom.
- 35.6 newtons (8 pounds-force) average for looped carpet tile and 17.8 newtons (4 pounds-force) average for bonded cut pile, as tested by ASTM D1335-98, *Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings*.

9.4.7. Backings.

9.4.7.1. Both primary and secondary backings must be a synthetic material. Jute back is not authorized.

9.4.7.2. Use of attached cushion back is optional. Products using an attached cushion may be accepted for heavier usage when substantiated by independent testing. Using the CRI test criteria and test results may indicate improved appearance, *i.e.*, a heavy rating will actually have an Appearance Retention Rating (ARR) of “severe” (see paragraph 9.4.8.4). Open-cell urethane cushion or closed-cell vinyl backings are authorized.

Note: If a PVC (polyvinyl chloride) backing is specified, use an adhesive recommended by the manufacturer and check for compatibility with any sealants or old adhesives during installation to prevent reaction with the carpet.

9.4.7.3. Carpet systems (carpet and pad) must include a non-textured slab rubber pad with a minimum density of 22 pounds per cubic foot). Recycled pad must meet this criterion. In medical facilities, carpet systems are authorized only in the command suite, administrative areas, pharmacy, and record departments.

9.4.7.4. For carpet padding in family housing, use 12.7-millimeter (0.5-inch) bonded urethane cushion with a clear poly web backing and a density of 7.5 to 8 pounds per cubic foot.

9.4.8. Testing.

9.4.8.1. Colorfastness. Colorfastness to light (fading) will comply with American Association of Textile Chemists and Colorists (AATCC) Test Method (TM) 16E, *Colorfastness to Light*, and will have a minimum of 4 after 40 AATCC fading units using the AATCC gray scale for color change.

9.4.8.2. Electrostatic Propensity (Maximum):

- 3.5 kilovolts (kV) or less for general commercial areas.
- 2.0 kV or less for critical environments (such as equipment/technical rooms of communication facilities) as tested by the AATCC TM 134-1996, *Electrostatic Propensity of Carpets*.

9.4.8.3. Fire Resistance.

9.4.8.3.1. Carpet for all areas except corridors must conform to CFR Part 1630, *Standard for the Surface Flammability of Carpets and Rugs (FF 1-70)* (Pill Test).

9.4.8.3.2. Carpet and carpet systems (carpet and pad) for corridors must meet ASTM E648-00, *Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source*, and the following criteria:

- Minimum average critical radiant flux of 0.45 watt per square centimeter (Class I) or greater within fire egress routes in unaccompanied personnel housing, child development centers, detention and correctional facilities, lodging facilities, and hospitals. **Note:** If protected by a sprinkler system, Class II may be installed.
- Minimum average critical radiant flux of 0.22 watt per square centimeter (Class II) in all other facilities.

9.4.8.3.3. Flammability tests from foreign countries are accepted for carpet and carpet tiles if they exceed or conform to the tests listed in paragraphs 9.4.8.3.1 and 9.4.8.3.2.

9.4.8.4. Appearance Retention Rating (ARR). The end use application of a carpet will determine carpet wear classification and ARR.

- Moderate classification has a 2.5 – 3.0 ARR.
- Heavy classification has a 3.0 – 3.5 ARR.
- Severe classification has a 3.5 – 4.0 ARR.

The ARR scale must be used in accordance with the recommended practice outlined in CRI TM-101, *Assessment of Carpet Surface Appearance Change Using the CRI Reference Scales*.

9.4.8.5. Indoor Air Quality. Carpet should bear the CRI “Green Label” for Indoor Air Quality (IAQ) testing.

10. Installation.

10.1. Contractor Qualifications. All work is to be performed by contractors/installers who are CFI Certified Floorcovering Installers (International Certified Floorcovering Installer Association) or manufacturer’s approved installers. Foremen on the job-site must be “Certified C-II Minimum.”

10.2. Methods.

10.2.1. For warranties to be valid, install all carpet in accordance with the installation guidelines set forth by the manufacturer and/or the minimum guidelines set forth in CRI 104-1996, *Standard for Installation of Commercial Carpet*, and CRI 105-2002, *Standard for Installation of Residential Carpet*.

10.2.2. Reference the Air Force *Carpet Selection Handbook* for descriptions of the various methods of installing broadloom carpet and carpet tile.

10.2.3. Consider alternative carpet installation systems that use dry adhesives or mechanical bonding to eliminate emissions of odor and volatile organic compounds (VOC), or use low-emitting wet adhesives without a solvent base.

10.2.4. In family housing, install carpeting over a pad; direct "glue-down" is not allowed.

10.2.5. Provide transition strips or protective edges where carpet meets other flooring materials.

10.2.6. Provide a soil walk-off area or mat for carpet in entry areas.

10.3. Environmental Conditions. Proper environmental conditions must be maintained before, during, and after installation. Provide adequate ventilation during installation and for 48 to 72 hours thereafter to dissipate new carpet odors.

10.4. Recordkeeping. The BCE will keep the following information for each carpet installation:

- Location (address, building number, and room).
- Name of carpet manufacturer, pattern, and color.
- Carpet certification/record that the carpet conforms to the Air Force Carpet Standards (most recent ETL).
- Date of installation.
- Method of installation and substrate.
- Disposal certification.

11. Maintenance.

11.1. Carpet should be cleaned and maintained according to the manufacturer's recommendations. Both preventive and corrective maintenance must be performed to retain the original appearance and antimicrobial characteristics. See Chapter 7 of the *Air Force Carpet Selection Handbook*.

11.2. Identify and remove stains and spillage immediately.

11.3. Establish a maintenance program for periodic vacuuming and professional cleaning.

11.3.1. Regular vacuuming will remove light soils that can damage carpet fibers.

11.3.2. Obtain carpet manufacturer's guidelines for frequency of professional cleaning. Hot water extraction methods, using only hot water, are recommended for most carpets. Do not use detergents, shampoo, or liquid cleaning chemicals. Do not saturate carpet.

11.3.3. Do not mix dry-cleaning chemicals with hot-water-cleaning materials.

11.3.4. Remove furniture before cleaning, or place plastic or aluminum foil under and around furniture to prevent rust and stains from forming on the carpet. Leave plastic or foil in place until carpet is completely dry.

12. Removal and Disposal.

12.1. In accordance with EPA guidelines to reduce landfilling, provide for carpet and carpet installation waste handling in the overall waste management plan of a project. When feasible, all disposal of carpet and carpet installation waste should require a certification that the products were not deposited in a landfill. There are carpet reclamation centers in most major cities. Costs for using these centers compare favorably with landfill costs. A search by location can be found online at: http://flooring.dupont.com/NASApp/dcf/LocationFinderServlet_D.

12.2. Carpet containing hazardous substances must be disposed of in accordance with hazardous waste regulations.

13. Point of Contact. Recommendations for improvements to this ETL are encouraged and should be furnished to: HQ AFCEE/DCD, 2735 Louis Bauer Drive, Brooks AFB, 78235-5133, Attention: Ms. Sandy Warner, DSN 240-4201, commercial (210) 536-4201, FAX 240-9004, e-mail sandy.warner@brooks.af.mil

MICHAEL J. COOK, Colonel, USAF
Director of Technical Support

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1. Minimum Pile Weight to Density Ratio (Inch-Pound Units)
2. Minimum Pile Weight to Density Ratio (Standard International Units)
3. Areas of Use and Wear Classification
4. Distribution List

Minimum Pile Weight to Density Ratio (Inch-Pound Units)

| Yarn Weights and Density | Nylon Fibers | | Wool and Wool/Nylon | | Polyester (PET) | |
|--------------------------|--------------------|---------|---------------------|---------|--------------------|---------|
| Surface Texture | oz/yd ² | Density | oz/yd ² | Density | oz/yd ² | Density |

Tufted Carpet/Carpet Tile: Wear Level — Heavy

| | | | | | | |
|------------------|----|------|----|------|----|--|
| a. Loop Pile | 24 | 4500 | 42 | 6000 | NR | |
| b. Loop Tile | 24 | 4500 | NR | | NR | |
| c. Cut Pile Tile | 26 | 5000 | NR | | NR | |
| d. Cut Pile | 32 | 4500 | 46 | 4300 | NR | |
| e. Frieze | 32 | 4500 | 50 | 4000 | NR | |
| f. Cut and Loop | 26 | 4500 | 50 | 4800 | NR | |

Tufted Carpet/Carpet Tile: Wear Level — Severe (Extra Heavy)

| | | | | | | |
|-----------------|----|------|----|--|----|--|
| a. Loop Pile | 32 | 6000 | NR | | NR | |
| b. Loop Tile | 24 | 6000 | NR | | NR | |
| c. Cut Pile | 36 | 6000 | NR | | NR | |
| d. Frieze | 36 | 6000 | NR | | NR | |
| e. Cut and Loop | 30 | 6000 | NR | | NR | |

Woven or Bonded Carpet/Carpet Tile: Wear Level — Heavy

| | | | | | | |
|------------------|----|------|----|------|----|--|
| a. Loop Pile | 24 | 4500 | 42 | 6000 | NR | |
| b. Cut Pile | 30 | 4500 | 46 | 4300 | NR | |
| c. Cut Pile Tile | 26 | 4200 | NR | | NR | |
| d. Frieze | 30 | 4500 | 50 | 4000 | NR | |
| e. Cut and Loop | 26 | 4500 | 50 | 4800 | NR | |

Woven or Bonded Carpet/Carpet Tile: Wear Level — Severe (Extra Heavy)

| | | | | | | |
|------------------|----|------|----|--|----|--|
| a. Loop Pile | 30 | 5500 | NR | | NR | |
| b. Cut Pile | 36 | 5500 | NR | | NR | |
| c. Cut Pile Tile | 28 | 4400 | NR | | NR | |
| d. Frieze | 36 | 5000 | NR | | NR | |
| e. Cut and Loop | 30 | 5500 | NR | | NR | |

Tufted Carpet/Carpet Tile: Wear Level — Light/Moderate

| | | | | | | |
|-----------------|----|------|----|--|----|------|
| a. Loop Pile | 24 | 3200 | NR | | NR | |
| b. Loop Tile | NR | | NR | | NR | |
| c. Cut Pile | 32 | 3200 | NR | | 45 | 5200 |
| d. Frieze | 32 | 3200 | NR | | 45 | 5200 |
| e. Cut and Loop | 24 | 3200 | NR | | NR | |

NR – Not Recommended or not available

$$\text{Density} = \frac{36 \times \text{Pile Weight (oz/yd}^2\text{)}}{\text{Pile Height (inches)}}$$

Note: See Attachment 3 for wear classification by facility type and area.

Minimum Pile Weight to Density Ratio (Standard International Units)

| Yarn Weights and Density | Nylon Fibers | | Wool and Wool/Nylon | | Polyester (PET) | |
|--------------------------|------------------|---------|---------------------|---------|------------------|---------|
| Surface Texture | g/m ² | Density | g/m ² | Density | g/m ² | Density |

Tufted Carpet/Carpet Tile: Wear Level — Heavy

| | | | | | | |
|------------------|------|------|------|------|----|--|
| a. Loop Pile | 814 | 4500 | 1424 | 6000 | NR | |
| b. Loop Tile | 814 | 4500 | NR | | NR | |
| c. Cut Pile Tile | 882 | 5000 | NR | | NR | |
| d. Cut Pile | 1085 | 4500 | 1560 | 4300 | NR | |
| e. Frieze | 1085 | 4500 | 1696 | 4000 | NR | |
| f. Cut and Loop | 882 | 4500 | 1696 | 4800 | NR | |

Tufted Carpet/Carpet Tile: Wear Level — Severe (Extra Heavy)

| | | | | | | |
|-----------------|------|------|----|--|----|--|
| a. Loop Pile | 1085 | 6000 | NR | | NR | |
| b. Loop Tile | 814 | 6000 | NR | | NR | |
| c. Cut Pile | 1221 | 6000 | NR | | NR | |
| d. Frieze | 1221 | 6000 | NR | | NR | |
| e. Cut and Loop | 1017 | 6000 | NR | | NR | |

Woven or Bonded Carpet/Carpet Tile: Wear Level — Heavy

| | | | | | | |
|------------------|------|------|------|------|----|--|
| a. Loop Pile | 1017 | 4500 | 1424 | 6000 | NR | |
| b. Cut Pile | 1017 | 4500 | 1560 | 4300 | NR | |
| c. Cut Pile Tile | 882 | 4200 | NR | | NR | |
| d. Frieze | 1017 | 4500 | 1696 | 4000 | NR | |
| e. Cut and Loop | 882 | 4500 | 1696 | 4800 | NR | |

Woven or Bonded Carpet/Carpet Tile: Wear Level — Severe (Extra Heavy)

| | | | | | | |
|------------------|------|------|----|--|----|--|
| a. Loop Pile | 1017 | 5500 | NR | | NR | |
| b. Cut Pile | 1221 | 5500 | NR | | NR | |
| c. Cut Pile Tile | 950 | 4400 | NR | | NR | |
| d. Frieze | 1221 | 5000 | NR | | NR | |
| e. Cut and Loop | 1017 | 5500 | NR | | NR | |

Tufted Carpet/Carpet Tile: Wear Level — Light/Moderate

| | | | | | | |
|-----------------|------|------|----|--|------|------|
| a. Loop Pile | 814 | 3200 | NR | | NR | |
| b. Loop Tile | NR | | NR | | NR | |
| c. Cut Pile | 1085 | 3200 | NR | | 1696 | 5200 |
| d. Frieze | 1085 | 3200 | NR | | 1696 | 5200 |
| e. Cut and Loop | 814 | 3200 | NR | | NR | |

NR – Not Recommended or not available

$$\text{Density} = \frac{27 \times \text{Pile Weight (g/m}^2\text{)}}{\text{Pile Height (mm)}}$$

Note: See Attachment 3 for wear classification by facility type and area.

Areas of Use and Wear Classification

| End-Use Application | Minimum Use Classification |
|---|----------------------------|
| Banks and Credit Unions | |
| Entrances and customer banking space | Severe |
| Open office space, private offices | Heavy |
| Bowling Centers | |
| Concourses (excluding food service, working, and storage areas) | Severe |
| Chapels and Other Religious Facilities | |
| Educational wing, worship areas | Heavy |
| Clubs | |
| All areas | Severe |
| Gymnasiums | |
| All areas | Severe |
| Laboratories and Research Facilities | |
| Computer work areas | Severe |
| Closed private office | Heavy |
| Open work areas, dry labs | Severe |
| Libraries | |
| Conference rooms | Severe |
| Corridors | Severe |
| Lodging Facilities and Dormitories | |
| Conference rooms | Severe |
| Combination living/sleeping rooms | Severe |
| Dining facilities | Severe |
| Offices | Severe |
| Public areas, lobbies, lounges, TV rooms, day rooms | Severe |
| Sleeping rooms | Heavy |
| Medical Facilities (excluding patient treatment areas) | |
| Assisted living areas | Heavy |
| Classrooms | Heavy |
| Clinical waiting areas (e.g., outpatient, pharmacy, ancillary zone) | Severe |
| Chapels | Moderate |
| Corridors, elevators | Severe |
| Dining facilities | Severe |
| Entrance areas (walk-off mats should be used) | Severe |
| Libraries | Moderate |
| Lobbies | Severe |

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| Medical Facilities (Continued) | | |
| Offices, private and semi-private | | Severe |
| Lounges | | Heavy |
| Patient rooms | | Heavy |
| Playrooms at OB/gyn and pediatric clinics | | Severe |
| Staff sleeping and watch areas | | Moderate |
| Military Housing | | |
| Single Family | | |
| Family rooms, living rooms, dining rooms | | Heavy |
| Sleeping rooms | | Moderate |
| Combination living/sleeping rooms | | Heavy |
| Multi-family | | |
| Common areas, lobbies, lounges | | Severe |
| Corridors | | Severe |
| Family rooms, living rooms, dining rooms | | Heavy |
| Multi-purpose areas | | Severe |
| Sleeping rooms | | Moderate |
| Combination living/sleeping rooms | | Heavy |
| Unaccompanied Officer's Quarters | | |
| Sleeping and living rooms | | Moderate |
| Public areas, lobbies, lounges | | Severe |
| Dining facilities | | Severe |
| Offices | | Moderate |
| Unaccompanied Enlisted Quarters | | |
| Sleeping and living rooms | | Severe |
| Public areas, lobbies, lounges | | Severe |
| Dining facilities | | Severe |
| Offices | | Heavy |
| Museums | | |
| All areas | | Severe |
| Music or Drama Centers | | |
| All areas | | Severe |
| Offices (including administrative areas) | | |
| Closed private office | | Heavy |
| Corridors | | Severe |
| Conference rooms | | Heavy |
| Open plan office: circulation areas | | Severe |
| Open plan office: work areas | | Heavy |

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| Restaurants (excluding work spaces) | | |
| Dining areas | | Severe |
| Cafeteria-type dining areas | | Severe |
| Enlisted canteens | | Severe |
| Office areas | | Heavy |
| Retail Stores | | |
| Offices | | Heavy |
| Restaurant and cafeteria dining areas | | Severe |
| Sales areas | | Severe |
| Theaters | | |
| All areas | | Severe |
| Training Buildings and Educational Facilities (including dependents' schools) | | |
| Classrooms | | Severe |
| Corridors | | Severe |
| Staff and administration offices | | Heavy |
| Youth Centers | | |
| All areas | | Severe |

NOTE: Use lower wear classification only where applicable based on expected wear.

DISTRIBUTION LIST

DEPARTMENT OF DEFENSE

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| Defense Commissary Service Director of Facilities Bldg 8400 Lackland AFB TX 78236-5000 | (1) | Defense Technical Information Center ATTN: DTIC-FDA Alexandria VA 22034-6145 | (1) |
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| AAFES/ATTN: CFE PO Box 660320 Dallas TX 75266-0320 | (1) |
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SPECIAL INTEREST ORGANIZATIONS

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| IHS (S. Carter) 15 Inverness Way East Stop A-111 Englewood CO 80112 | (1) | Construction Criteria Database National Institute of Bldg Sciences 1201 L Street NW, Suite 400 Washington DC 20005 | (1) |
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